

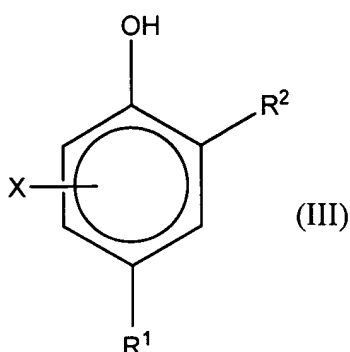
Amendments to the Claims

I. Amendments

Please amend claims 1 and 27 to read as indicated below.

II. The Claims of the Application

- Claim 1. **[Previously Presented]** A method of producing a modified chitosan polymer or oligomer, comprising:
reacting an enzyme with at least one phenolic compound in the presence of a chitosan polymer or oligomer, wherein the reaction is carried out in a homogenous phase solution, and producing an insolubilized modified chitosan polymer or oligomer; and
solubilizing the modified chitosan polymer or oligomer.
- Claim 2. **[Original]** The method of claim 1, wherein the enzyme is an enzyme that uses molecular oxygen as an oxidizing agent to oxidize phenolic compounds.
- Claim 3. **[Original]** The method of claim 2, wherein the enzyme is a tyrosinase, a phenol oxidase, a polyphenol oxidase, or a mixture thereof.
- Claim 4. **[Previously Presented]** The method of claim 1, wherein the at least one phenolic compound is phenol, a substituted phenol, a polymer having at least one phenolic moiety or tyrosine residue, or a protein having at least one phenolic moiety or tyrosine residue.
- Claim 5. **[Original]** The method of claim 4, wherein the at least one phenolic compound is a compound having the formula



wherein R¹ is hydrogen, hydroxyl, alkyl or substituted alkyl, alkenyl or substituted alkenyl, cycloalkyl or substituted cycloalkyl, cycloalkenyl or substituted cycloalkenyl, aryl or substituted aryl, amino or substituted amino, carboxylic acid or carboxylic acid ester, or an aldehyde or keto group;

R² is H or OH; and

X is one or more additional substituents that can be halogen, hydroxyl, alkyl or substituted alkyl, alkenyl or substituted alkenyl, cycloalkyl or substituted cycloalkyl, cycloalkenyl or substituted cycloalkenyl, aryl or substituted aryl, amino or substituted amino, carboxylic acid or carboxylic acid ester, or two adjacent substituents which are joined to form a ring.

Claim 6. **[Original]** The method of claim 1, wherein the at least one phenolic compound is selected from the group consisting of phenol, 2-chlorophenol, 2,2'-dihydroxybiphenyl, 8-hydroxyquinoline, 3-amino-phenol, o-cresol, m-cresol, p-cresol, 2,3-dimethylphenol, 2-methoxyphenol, resorcinol, 1-nitrosonaphthol, hydroquinone, 4-chlorophenol, 4,4'-dihydroxybiphenyl, 2-aminophenol, 3-methoxyphenol, 1-naphthol, 4-phenylphenol, p-hydroxyphenoxyacetic acid, 5-methylresorcinol, tert-butylcatechol, catechol, methylcatechol, tyramine, dopamine, caffeic acid, hydroxycinnamic acid and chlorogenic acid.

- Claim 7. **[Original]** The method of claim 6, wherein the at least one phenolic compound is chlorogenic acid, caffeic acid, p-cresol, catechol, dopamine or a mixture thereof.
- Claim 8. **[Original]** The method of claim 1 wherein the at least one phenolic compound is a mixture of phenolic compounds.
- Claim 9. **[Original]** The method of claim 1, wherein the solution is an aqueous solution or an aqueous alcohol solution.
- Claim 10. **[Currently Amended]** The method of claim 9, wherein the solution has a pH of less than **about** 6.5.
- Claim 11. **[Currently Amended]** The method of claim 9, wherein the solution has a pH of at least **about** 8.
- Claim 12. **[Original]** The method of claim 1 wherein the modified chitosan polymer or oligomer is soluble in aqueous alkaline solution.
- Claim 13. **[Original]** The method of claim 12, wherein the solution is an aqueous solution or an aqueous alcohol solution.
- Claim 14. **[Currently Amended]** The method of claim 12, wherein the reaction is carried out at a pH of **about** 5.5 to **about** 6.5.
- Claim 15. **[Currently Amended]** The method of claim 12, wherein the modified chitosan polymer or oligomer is soluble in aqueous alkaline solutions having a pH of at least **about** 8.
- Claim 16. **[Currently Amended]** The method of claim 15, wherein the modified chitosan polymer or oligomer is soluble in aqueous alkaline solutions having a pH of **about** 8 to **about** 14.

- Claim 17. **[Original]** The method of claim 12, wherein the modified chitosan polymer or oligomer is soluble in aqueous acidic solutions.
- Claim 18. **[Original]** The method of claim 12, wherein the modified chitosan polymer or oligomer is insoluble in aqueous solutions having a neutral pH.
- Claim 19. **[Currently Amended]** The method of claim 10, wherein the modified chitosan polymer or oligomer is soluble in aqueous alkaline solutions having a pH of at least ~~about~~ 8, soluble in aqueous acidic solutions, and insoluble in aqueous solutions having a neutral pH.
- Claim 20. **[Currently Amended]** The method of claim 1, wherein the said method produces a modified chitosan polymer or oligomer ~~has a high~~ having a higher viscosity in solution than that of the chitosan polymer or oligomer prior to said reaction.
- Claim 21. **[Currently Amended]** The method of claim 20, wherein the viscosity of a solution of the modified chitosan polymer or oligomer is at least ~~about~~ 1 poise.
- Claim 22. **[Currently Amended]** The method of claim 21, wherein the viscosity of a solution of the modified chitosan polymer is at least ~~about~~ 40 poise.
- Claim 23. **[Currently Amended]** The method of claim 22, wherein the viscosity of a solution of the modified chitosan polymer or oligomer is at least ~~about~~ 400 poise.
- Claim 24. **[Original]** A method of producing a modified chitosan polymer, which comprises:
- (a) providing a chitosan polymer or oligomer solubilized in a solution;
 - (b) reacting an enzyme with at least one phenolic compound in the presence of the chitosan polymer or oligomer to produce a modified

chitosan polymer or oligomer; and

- (c) further reacting an enzyme with at least one phenolic compound in the presence of the modified chitosan polymer or oligomer to produce a further modified chitosan polymer or oligomer.

Claim 25. **[Original]** The method of claim 24, which further comprises repeating step (c) to further modify the modified chitosan polymer.

Claim 26. **[Currently Amended]** The method of claim 24, wherein the reaction of step (b) is carried out at a pH of ~~about~~ 5.5 to ~~about~~ 6.5.

Claim 27. **[Currently Amended]** The method of claim 24, wherein the reaction of step (c) is carried out at a pH greater than ~~about~~ 6.5.

Claim 28. **[Currently Amended]** The method of claim 27, wherein the reaction of step (c) is carried out at a pH of at least ~~about~~ 8.

Claims 29-34 **[Cancelled]**

Claim 35. **[Previously Presented]** The method of claim 1, further comprising further reacting the modified chitosan polymer or oligomer.

Claim 36. **[Previously Presented]** The method of claim 35, wherein said further reacting is performed in an alkaline solution.

Claim 37. **[Previously Presented]** The method of claim 35, wherein said further reacting comprises reacting an enzyme with at least one phenolic compound in the presence of the modified chitosan polymer or oligomer to produce a further modified chitosan polymer or oligomer.

Claim 38. **[Previously Presented]** The method of claim 35, wherein said further reacting comprises reacting an attached moiety of the modified chitosan

polymer or oligomer, the attached moiety being derived from at least one of the enzyme and the phenolic compound.

- Claim 39. **[Previously Presented]** The method of claim 1, wherein said reacting comprises leaving an unmodified portion of the chitosan polymer or oligomer unreacted, and wherein the method further comprises separating the unmodified portion and the modified chitosan polymer or oligomer from one another.
- Claim 40. **[Previously Presented]** The method of claim 1, wherein the phenolic compound is selected from the group consisting of a phenolic protein and a phenolic peptide.
- Claim 41. **[Previously Presented]** The method of claim 24, wherein the at least one phenolic compound reacted in step (b) is different from the at least one phenolic compound further reacted in step (c).
- Claim 42. **[Previously Presented]** The method of claim 24, wherein said reacting step (b) comprises leaving an unmodified portion of the chitosan polymer or oligomer unreacted, and wherein the method further comprises separating the unmodified portion and the modified chitosan polymer or oligomer from one another prior to said further reacting step (c).
- Claim 43. **[Previously Presented]** A method of producing a modified chitosan polymer or oligomer, which comprises reacting an enzyme with at least one phenolic compound selected from the group consisting of a phenolic protein and a phenolic peptide in the presence of a chitosan polymer or oligomer, wherein the reaction is carried out in a homogenous phase solution.
- Claim 44. **[Currently Amended]** A method of producing a modified chitosan polymer or oligomer, comprising:

dissolving a chitosan polymer or oligomer in solution at a first acidic pH;
raising the pH of solution to a second acidic pH less than **about** 6.5; and
reacting an enzyme with at least one phenolic compound in the presence of
the chitosan polymer or oligomer, wherein the reaction is carried out in a
homogenous phase solution.

Claim 45. **[Currently Amended]** The method of claim 44, wherein the first acidic pH
is **about** 2-3.

Claim 46. **[Previously Presented]** The method of claim 44, wherein the solution is
aqueous.